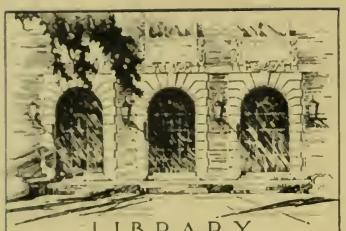

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John G. Gallard

THEOLOGY AND SCIENCE

from Rev F. Paget
Oxford. Feb. 1884.

An Address

DELIVERED TO STUDENTS PREPARING FOR ORDINATION

AT THE CLERGY SCHOOL AT LEEDS,

IN DECEMBER, 1880

BY

SIR JAMES PAGET, BART., F.R.S.

RIVINGTONS
WATERLOO PLACE, LONDON
Oxford and Cambridge
MDCCCLXXXI.

THEOLOGY AND SCIENCE.

When your Vicar and my son asked me to address you, it seemed to me that, among the very few subjects not too remote from your studies on which I could venture to speak, the best might be the position of antagonism in which theology and science seem to stand. I thought that, having some knowledge of one of these subjects and a profound respect for both, I might be able to show you some of the reasons for this antagonism; and that, while showing them, the most prudent methods of dealing with it might appear.

It has come to be supposed by many that science in its modern form is always opposed not only to intellectual and inferential theology but to the Christian religion. This supposition is not just. The proportion of scientific men who profess the Christian faith is, I believe, about the same as that of literary men or of lawyers or merchants or any other group of men in the same social position or of equal general culture. You will find among scientific men very few who

attack either theology or religion. The attacks imputed to them are made, for the most part, by those who, with a very scanty knowledge of science, use, not its facts, but its most distant inferences, as they do whatever else they can get from any source, for the overthrow of religious beliefs.

Still, it is quite true and need not be doubted that, on many subjects with which both are concerned, theology and science are often at variance; that, of their several beliefs some seem at present irreconcileable; and that some are held to be so utterly incompatible that if one of them be true, the other must be false. I believe, too, that many who hold by both science and theology are conscious that they do not maintain the truths of both on similar grounds; they adhere to the one with a degree of faith which they would hold to be in the other an unwise credulity. And in this I suppose that practical theologians would think them very right; telling as they do that religion is not wholly a matter of intellectual discernment, not a matter to be classed with all those of science which "come with observation;" that it is not only with the head but "with the heart" that "man believeth." You may be as sure as you can be of anything of the kind that there are good Christians among those who maintain in science some opinions which some theologians deem dangerous; and perhaps I may be able to show you how this may well be.

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The first step towards an explanation of the oppositions of science and theology may be made, I believe, by the admission of a fact which the common affairs of life as well as all history may prove, namely, that in all subjects in which beliefs or opinions are based on inferences from imperfect knowledge, wide differences exist among persons of different mental constitutions or of different mental culture.

I hardly need say that this is the very condition in which the controversies of science and theology are maintained; that they arise, as from time immemorial they have arisen, in inferences from imperfect knowledge.

In science this imperfection is evident to every one who knows anything at all. All scientific men would agree that their increasing knowledge has always brought them to a larger view of the unknown; all would admit the justice of the common illustration that as they have ascended the hill so have they seen, however dimly, more of the distant valleys and streams not yet explored. I suppose it is the same with theologians. You will all say "we see as in a glass, darkly;" "we know in part;" that even revelation is incomplete and the understanding of it very limited by the utter imperfection of human language for the expression of the mind of God.

Then, next, let it be observed that, in this general imperfection of knowledge on both sides, the disputes between science and theology almost

always begin in questions concerning those very parts of each in which the attainment of nearly certain knowledge is most difficult, or (may it not be said?) impossible. They do not begin on matters of fact or of clear induction; and, though they may lead up to them, they do not begin on subjects on which there has been clear revelation. There is, really, no article of any of the Christian creeds which can be a subject of direct scientific inquiry. Neither do these disputes begin on questions of history or of morality. They begin,—whatever subjects may in a prolonged contest be invaded—they begin in questions on which knowledge is neither clearly revealed nor clearly within the present reach of science; in such questions as the method of creation, the relation of man to the lower animals, the nature and relations of mind and matter, on free-will and law, on the possible nature and conditions of states of conscious existence other than those in which we live. No one can justly maintain that either revelation or science can supply nearly exact knowledge on these matters, or can make us sure of what may be inferred from what we think on them. Yet, on all of them, both theologians and men of science, and many who are neither, are apt to draw inferences and frame beliefs from what they think to be most likely; and they draw them in different directions; and then their beliefs become so pleasant and seem to fit the facts so well, that each side is ready to hold everything to be untrue

which will not fit-in with its own belief. Thus, or by some such course as this, it has come to pass that some, relying on theology, think that, by distant inferences from incomplete revelation, they can assign limits to science; and some, relying on science, suppose that, by as far-reaching deductions from incomplete knowledge, they can prove the fallacy of revelation.

Now, it will be well for you to accept it at once as a certainty that disputes such as these are natural and inevitable; except in the gravity of the consequences to which they may lead, they are only such as occur on all matters in which opinions are given on things concerning which knowledge is incomplete. The students of science and of theology would form a very strange exception from the general rule if they did generally agree on doubtful matters. For, on what doubtful things do men generally agree? on what are they content to doubt? on what do some not decide and then divide into parties mutually aggressive? Surely it has all the generality of a law of our nature that, on all doubtful matters, the vast majority of men refuse to wait for knowledge, and arrange themselves in parties, each of which maintains that itself is sole possessor of the truth. Instances of this rule are everywhere; it is, I say, like a law of our nature; you see it in the great field of imperial politics and in the little one of parish-vestries; you see it in literature, in art, in fashions; you see it everywhere.

It is well to remember this because it may help to show that the antagonism of which I am to speak is not wholly the fault of those engaged in it, or of either of the subjects which they discuss. Still, we might expect that the antagonism between theologians and men of science would be unceasing and very earnest. For it would be safe to assume that, in most instances, men choose the study of the one or the other of these subjects because of some natural inclination implying some mental fitness or disposition for the method of thought required for it. But even if we were to assume, improbable as it may be, that the students of both subjects start all alike and similarly minded, they could not so remain after training so different as theirs. I do not for a moment suggest that one mode of training is absolutely better than the other; I do not doubt that each is, on the whole, the best for the work to be done after it; but think how different they are.

There is, indeed, no mental power for which there is not as full range in theology as in science; none of which some of the best models may not be found among theologians; but, during pupil-age, the general trainings are very different and their influence is rarely lost. The scientific student is encouraged to inquiry, guessing, and testing, the theological to acceptance of acknowledged truth; the one is assured that knowledge cometh with observation, the other that it does not all so come, and that much is given to him

that will do the Will of God; the one is guided to the exclusion of all sentiment and partiality, the other to such intense desire for the honour of God and our Saviour as shall wish everything to be true that can minister to it.

In conditions such as these, it seems inevitable that when any doubtful thing is studied by both theologians and men of science—especially if it be studied by those who are by mind or education chiefly either the one or the other—their conclusions should be different. It is as if two groups of men, placed at stations wide apart, were to look into a dark room containing various strange objects, on which each group could throw from afar some light. The glimmerings of the various forms, lighted from their different lamps, could not seem alike to all; you would not expect the same descriptions from them all, much less the same inferences and reasonings on what they had seen. Similarly, when theologians pure and men of science pure study and reflect on any doubtful matter, it cannot but happen that the opinions of the one group should often seem to the other absolutely wrong and mischievous, wrong and incompatible with the truth.

Thus, then, the existence of these disputes may be explained without assuming or believing in any necessary opposition between the truths of science and religion. And you may hold it for certain that such disputes as these will continue. As knowledge advances, so will discussions be re-

newed on constantly new questions and on old ones in constantly changing terms; and the discussions will still be sharp, for the temper of opposition to religion will always exist in some persons, and the temper of unreasonable fear of change in others; and, perhaps above all, the disputes will continue, because we love to hold by what we think, for what we think has in it more of ourselves than what we know.

It may even seem likely that, in the future, as knowledge widens and divides its fields, and men's studies become more specialized and distinct, the opposition will become more intense, the deviations wider, the difficulty of reconciliation greater; for each group will become less and less able to appreciate the works of the others. A learned professor of Tübingen speaking, not long ago, of the progress of knowledge, said that he feared that the temple of science would fail of being finished for the same reason as did the Tower of Babel, because the workmen did not know each other's language. And there is, indeed, great truth in the symbol. There are very few men living who can, I will not say study, but even understand the language of the whole of any recent volume of the Philosophical Transactions of the Royal Society.

But on this point the history of science is opposed to what we might expect. As the field of science has been more divided, and studies have been more special, and men have worked on narrower fields, so has the unity of nature become

more evident; they have dug deeper and come nearer to a centre. Here is a point which seems to me most worthy of your regard. Let me illustrate it by some instances.

In my early studies it was held by many that Life, or the Vital Principle, that which was deemed the active power in all living things, was not only different from the principles at work in dead matter, but absolutely and essentially opposed to them all. It was thought in some measure profane and irreligious to hold that Life, regarded not as a condition but as a thing, could be in any kind of relation or alliance with anything acting in dead matter, as with chemical affinity, caloric, magnetism or anything of the kind. But, while men have been more and more separating themselves into groups of physiologists, and physicists, and chemists, and each of these again into lesser groups, the intimate relation of all the forces of matter whether living or dead, their correlations and mutual convertibility, have become more and more evident.

Similarly, it was believed, hardly more than half a century ago, that the chemical compositions of organic and of inorganic matter were essentially unlike, and that the organic could not be attained except through operations of a vital power. Now, chemistry makes hundreds of compounds, not distinguishable from those formed in living bodies; and the late researches of M. Friedel, showing that carbon, the most characteristic element of

organic compounds, can be replaced in some of them by silicon, one of the most characteristic elements of the inorganic, seem to show that all attempts to indicate a clear line of distinction between the chemistry of the living and that of the dead will fail.

Again, the likeness of things that were deemed diverse is illustrated by Darwin's observations on the carnivorous plants. One used to think that, if there were a sure mark of distinction between plants and animals, it was that these had, and those had not, stomachs with which they could digest, change, and appropriate alien nutritive substances. He has shown as true digestion in plants,—especially by the leaves of the Drosera, the little Sun-dew which you may gather on the moors —as can take place in any of our own stomachs; a digestion true, complete and similar to our own.

Yet further, Darwin's last book, on the "Movements of Plants," makes it more than ever clear that we must think very cautiously in assigning the existence of a nervous system as a really characteristic distinction between plants and animals. So, in respect of diseases, I have lately tried to show that between ours and theirs there is no difference of kind, however much theirs may be, in comparison, free from the complications of nervous system, moving blood and mind in which we have to study our own. Nay, even beyond plants; I have ventured to suggest that a truly

elemental pathology must be studied in crystals, after mechanical injuries or other disturbing forces.

I might cite many instances more, but these may suffice for illustration of the general fact, that in the progress of knowledge, while scientific men have seemed to be working more and more widely apart, they have found more and more near relations among all the objects of their study. As the rays of knowledge have extended and diverged, so has their relation to one common centre become more evident, and the unity of nature has become more significant of the unity of God.

Now, I would use these considerations as part of the reasons for inducing you to remember always, that when two beliefs seem incompatible, it does not follow that one is true and the other false; they may both be true. In the disputes of theologians and men of science, it is generally believed that one side must be in the wrong; yet, in many of them, both may be right, and their opposition may be due to their both being ignorant of some intermediate truth which, when gained by increasing knowledge, will combine the truths they now hold apart.

Many true things have been deemed incompatible, yet were all true; they were distant parts of one system of truth whose common bond was not yet found. I have spoken of the discovered correlation of the vital and the physical forces: I wish I could similarly reconcile the present

dispute about the relation of the mental and the physical, but, impossible as such a reconciliation may now seem, I venture to believe that some of you will see it. While physicists are striving in one direction, and metaphysicists in another, and each side is, perhaps, contemptuous of the methods of the other, they will gradually discover truths in the dark interspace between them, truths which will show not the error of either side, but only the imperfect knowledge of both. Or it may be that, even before this is done, some one mind, with a rare grasp of knowledge, will discern the bond by which their differences may be combined.

If you would look for the reconciliation of truths that seem incompatible, you may find them in the history of discoveries. If the knowledge possessed in any one century could have been declared to the most learned of the men of any century before it, the greater part of it would have been incompatible with their most sure and reasonable beliefs. If any one rubbing amber in the eighteenth century, and seeing it attract and repel a hair, had been told that therein was some of the sure beginning of the knowledge by which in the nineteenth century, men, thousands of miles apart, would talk with one another, would it not have been called utter folly and incompatible with most certain knowledge? Yet time and constant study have brought reconciliation, not by disproving the truths held in the last century, but by combining them with larger truths.

I remember performing an operation which, only a few years before, would have been intensely painful and attended with profuse bleeding. But, with the help of ether-inhalation and of an instrument then recently invented, it was absolutely painless, and only a few drops of blood were shed. And Sir William Lawrence who was sitting by said, "If, five years ago, any one had told me that he could do that operation without either pain or blood-shed, I should have been disposed to sign his certificate for Bedlam."

If, then, large parts of the sure knowledge of one century would have seemed incompatible with knowledge which was as sure in the century before and still remains sure, it should not be thought strange that some of the knowledge revealed, and revealed, as we may believe, because it is not within the attainment of human power, should seem at present incompatible with the truth which science does attain to: incompatible, not because of error in the interpretation of the revelation, or of error in science, but because of incompleteness in both, and because of the want of some intermediate truths by which both shall be combined.

In this view, I would urge you to maintain, in all these discussions, that both sides are right in that which may be claimed as well-ascertained knowledge; and that distant inferences on one side should not be allowed to weigh against knowledge or great probability on the other. If it be main-

tained, as an inference from facts in science, that miracles are impossible, or a resurrection, or that God became man, so let it be: from the purely scientific point of view such things seem impossible. But from the religious point of view we may hold them to be not only possible but sure; and the religious conviction has a right to be not less strong than the scientific. Let, then, each side hold firm by that for which there is clear evidence, whether it be of revelation or of science; let both wait and work for the intermediate truths that will prove both to be in the main right; let both be aware that the further they carry their inferences from what is known into that which is unknown, the greater is the probability of error and of controversy. Science cannot infer or define all possibilities; theology cannot interpret all the truths of science; on doubtful things they are nearly sure to disagree; they had better wait, not for an untying, but for the tying of the knot which shall combine their many truths in one.

Still, while waiting, there will be many controversies; of this you may be sure: and it is greatly to be wished that they should be managed better than they usually are. Let me suggest to you some further means by which you may help to this end.

I have often spoken of the imperfection of both scientific and theological knowledge; but this imperfection is very far from justifying the levity with which the knowledge of one side is some-

times regarded on the other. True, the knowledge of both sides is imperfect and may be thought trivial if we compare the quantity known with what we guess to be the quantity of the unknown; but, in both theology and science the knowledge of the learned is vast if we compare it with that of the unlearned. In one I know it, and in the other I believe it, to be larger than can be compassed by even the strongest intellect in even the longest life. Such knowledge should not be made light of. Neither should the vast labour and vast mental power which have been spent in attaining it. I speak to students of theology; think of the minds that have produced the knowledge of which you study the mere elements; think of their laborious research, their keen logic, their meditations, their earnest and pure love of truth. Ask yourselves, can all this have issued in mere fallacy? Surely not. But, think again; minds as strong, as keen, as earnest, and as truth-loving have been engaged in science; year after year their works accumulate, are discussed, approved. Can they have been wandering in error? or have they only now, at last, gone wrong? or can their conclusions or their very reasonable inferences be justly criticized with less knowledge or less mental discipline than you would think necessary for the criticism of one of your own great masters?

Here seems to me a chief fault of the dispute in the form in which it commonly prevails and makes the most noise. On each side, many persons, and

these not usually of the wisest, think it easy to judge and just to condemn the works of the most learned on the other side. This is, indeed, the way of the world; each man thinks it easy to judge in his neighbour's business. Mr. Darwin, for instance, endowed with a matchless power of observation, with the simplest and purest love of truth, with rare caution and rare power of reasoning on his facts, spends a long life in the study and interpretation of the ways of nature: he submits his facts and his beliefs to the scientific world; they are scrutinized and discussed, and approved by a vast majority of those who are able to judge them; and then some one with no more knowledge of natural history than may be gathered from popular lectures or magazines does not hesitate to speak of these beliefs as absurd, irreverent, subversive of the teaching of the Bible.

On the other side, Dr. Pusey or Dr. Westcott spends year after year in the study of theology, with all the helps of rare literary and linguistic knowledge, with keen analysis, deep reasoning and meditation, and with earnest longing for the truth; and some mere student of science, or one who, at most, has read a little theology at leisure times, thinks himself fit to decide that there cannot be good reasons for any of the beliefs which theologians such as these maintain and teach.

It is worth observing how general is this habit of thinking it much easier to ascertain the truth in another man's business than in one's own. A

magistrate, for instance, or any lawyer, would think it iniquitous if it were proposed to decide on any matter of fact in court—such, for instance, as whether a boy did or did not steal a pair of shoes—without examining on oath and thoroughly cross-examining every one supposed to know anything about it: he would accept nothing but what is sworn to; he would not let the boy be acquitted or convicted unless twelve men, on their oaths and directed by a learned and impartial judge, should agree that the boy did or did not steal those shoes. And yet, as I have often known, the same man will accept as a fact in medical science, as a fact by which he may guide his conduct, any careless statement made by a silly woman; or he will adopt, as a theological principle, the opinion of a poorly educated preacher or his less educated self. Now, his care in the charge of stealing is justified by his jealous fear of doing wrong; it is none too great; it would be well if, in every serious inquiry after truth, no consideration less complete than that of a judicial investigation were deemed sufficient. But the levity with which the same person decides in a matter of science or of theology argues an utterly erroneous estimate of the difficulty of ascertaining truth in other matters than those tried in law-courts; as if the evidences of scientific or of theological beliefs needed to be less, or were less hard to attain, than the evidence whether a certain pair of shoes were stolen by a certain boy.

It would be difficult to overstate the mischiefs of this levity of judgment in grave matters. It is, as I said, the way of the world; but students of truth, whether in theology or in science, should be "not of the world."

And yet more, let me venture to say, each side should avoid the habit of thinking that they can safely impute inferences as necessary consequences of the beliefs held by the other; that they can easily show what must come of carrying-out a belief to what they call its logical consequences. It is from this that much of the bitterest part of controversy is derived. It is declared that if this or that probably harmless opinion be allowed, some grievous error or some utter folly must come next. "It stands to reason," they say. "Stands to reason." One is tempted to ask, first, whose reason? Is it the reason of a really reasonable man? and of one well instructed in the subject of inquiry? But in any case, it should be remembered how many things that did stand to reason have fallen at the test of fact. I am sure it is true in science, I suspect it is true in theology, that all the beliefs which we now know to have been erroneous, and all the denials of what we now know to have been true, did once "stand to reason." They did so stand, with all seeming strength and security, in the minds of those who maintained them and were ready to defend them as certain truths. It stood to reason that the sun moved round the earth, and that people could be bewitched, and that the

moon had much to do with lunatics: it stood to reason, even with the rare power of reasoning of Bishop Berkeley, that tar-water would cure and prevent many serious diseases. And I suppose that in every heresy the error has stood to reason in the minds of many who held to it.

There are few expressions which, in serious matters, we should more carefully avoid than this, or any which imply that we can of our own mental power infer certainties, or settle the boundaries of probabilities, or the consequences of beliefs, in subjects which we have not thoroughly studied.

In all temptations to positive assertion in doubtful matters I have found great advantage from keeping in mind an opinion which I think must be just; for it is expressed, though in different terms, by two men of the highest mental power, yet so unlike that together they may express a very wide consent of thought, Mr. Darwin and Bishop Berkeley; the one, so far as I can judge, standing first in power of observing and judging on accumulated facts, the other as high in reasoning on thoughts. They both have held that strong convictions are not usually evidences of knowledge. Each of them says it after reflecting on the imperfection of knowledge in his own subject. How clearly and constantly should it be remembered by those who are ready to hold and to act upon strong convictions in their criticisms of the results or supposed consequences of other men's studies!

On this habit of being positive in doubtful things, of which the worst form is that of being positive in doubtful things which others have studied much more and in more appropriate manners than ourselves, let me recommend to you some sentences by Canon Mozley, who, more than any whose works I have read, seemed to combine the best powers of the theologian and the man of science. They are in the beginning of the conclusions with which he sums up his work on the Augustinian Doctrine of Predestination,—a work from which one of the clearest lessons is that, even in theology, there are truths which seem incompatible with one another, and yet must be held patiently till, in future knowledge, they may be reconciled. That which may be regarded as the text on which he here writes is his first sentence, "It were to be wished that that active penetration and close and acute attention which mankind have applied to so many subjects of knowledge, and so successfully, had been applied in somewhat greater proportion than it has been, to the due apprehension of that very important article of knowledge, their own ignorance." Let me advise you to study his exposition of this text, even though you may never need to use it in other than purely theological studies.

But now, I suspect that after I have talked so long of our imperfect knowledge, ignorance and doubts, you may be ready to ask, is doubtfulness to be a constant disposition of our minds? Is

doubt always to be encouraged in others? And to this I suppose that all prudent men would say, on many things "Yes," on some things "No." There are some certainties in science which may be deemed unalterable, though the methods of expressing them may change; and many more truths which future knowledge may modify and embody in larger truths but will not contradict. These things must be held absolutely, and they who raise doubts on them need not be listened to or answered. And so in theology, and in the Christian faith which it expounds; there are not only clear evidences which, in their accumulated force, cannot, I think, be reasonably resisted by those who will fairly collect and try them; but there are convictions of religious faith, not always based on knowledge, or on other evidence than the faith which is "the evidence of things unseen," which may justly be held as unalterable, because they are consistent with revelation, and have been sustained by the testimony of clouds of witnesses, and, I believe, have in many minds the testimony of God's in-dwelling Spirit.

It would be by complete wisdom if all the truths on both sides could be enumerated, and all the probabilities arranged in just order of merit; such wisdom would be more than human, though the tone of some controversialists may imply that it is not beyond the reach of very ordinary intellects. I only undertook to speak to you of some of the reasons for the antagonism between theology and

science, and of the disposition with which you may regard it. Of the truths and highest probabilities on both sides, I will only express my belief that they may justly be held together, though on different grounds; that they are not within reach of direct mutual attack; that those of one side cannot be directed against those of the other except by far-reaching inferences; by inferences of which the probability is in an inverse proportion to their distance from the truths or the reasonable beliefs on the one side or the other.

How, then, should you regard the conflict?

First, do not think of the controversies as if they were an unmixed evil. Evil they may be to some engaged in them; but they have the worth of that system of conflict and competition, out of which some of our highest good has come. Man has reached his present state in civilized races through an incessant struggle not only for food and life, but for intellectual mastery; for virtue as against those vices that are only brutality surviving; for truth as against error. The influences of Christianity and of civilization have made the struggle more gentle; the better sort of men do not destroy one another; but the law of conflict is not abrogated. The struggle which, from age to age, has ensured the survival of the fittest, has been under a law which includes intellectual conflicts and has constantly helped to the attainment of the truth.

I cannot doubt that, in theology, the thorough-

ness and clearness with which the truth has been and is maintained is due, in great measure, to the mental power exercised and provoked by controversy: and surely the conflict, unceasing as it has been, has added a weighty fact to the evidence of Christianity. I doubt whether there be any instance of a fallacy which has resisted for centuries the force of controversy among people of the same race and of high mental power. Fallacies have existed much longer and more widely than Christianity; but they have existed only when not closely examined by persons well-trained and willing to expose them, or in weak or untrained minds incapable of discerning truth and error. Witchcraft, for instance, and many like fallacies were long and widely believed in; but a century or less sufficed to dispel the belief in all intelligent minds, as soon as the grounds on which it rested were explored by men willing to doubt and able to observe and think. Christianity, from its very beginning to this day, has been maintained and disputed by some of the keenest intellects of the most cultivated races; yet it stands firm. And if, as is often said, it was never so assailed as in the last half century, it has assuredly in that same time attained a marvellous growth among all classes. The mere fact of its continued existence among intelligent people is a weighty evidence of its truth.

Thus, you may regard these controversies with, at least, much patience. Whether you need to

engage in them is not for me to say. If you do, let me advise you to remember always that there is nothing in the nature of the study of science to make those who pursue it more generally averse from religion than others of the same mental power. Among them, as among those engaged in literature, in art, in law, are men of various mental character, who are variously affected by the same evidence, variously by the same appeals to sentiment, variously by each of all the arguments that theology can use. Some men of science cannot accept religious doctrine on any evidence other than that which would suffice to establish a general law of nature; some cannot but believe that all which Christians refer to God's upholding and informing power is within the range of mere natural laws; some, not doubtful of the great central truths of religion, hesitate to accept a few or many of the theological inferences from them; some are, or might be, clerics, holding as fully as any that the whole teaching of the Church is true. In being thus various, scientific men are only, as other groups are, variously influenced by the same evidences.

It is, therefore, not against scientific men, or science itself, that you can need to contend; it must be, if at all, against inferences derived from scientific knowledge or belief, and used as arguments against religion. And, if you decide to contend, you should bind yourselves to a real study in science. Study it in any department

that you like. [I resist a great temptation to try to convert you all to the belief that science is a far more delightful pursuit than theology can be.] But in whatever part you choose, study it by observation, by experiment, by collecting, as well as by reading. And let your reading be in the works of the best masters, that you may learn their true spirit, their strength, their methods of observing and thinking, their accuracy in describing. No mere light or popular study of science can teach you this, or enable you to discern what in it is true, what is more or less probable, what is mere inference, what is mere guess. The more you learn, the more you will be able to think how much remains unknown; the more you will feel and be able to show the improbability that all that is now unknown can ever be comprised within the terms, however much extended, of the natural laws already known. It is in trying to think of the unknown that one may best feel confident that future discoveries, both in science and in the interpretation of revelation, will bring to men the knowledge by which beliefs, now seeming incompatible, will be reconciled.

Think, with all the imagination that you can, of the crowd of things unknown; the possible forces not yet discerned, or as little guessed at as was the electric three centuries ago; think of the possible new forms or properties of matter; of that fourth dimension which, I believe, some can conceive; think of our absolute relation in continuity

with the whole world of that which transmits light, and of the real nature of which I suppose that scarcely more is known than that it is not nothing. May we not be sure that the study of these things unknown will in time, however distant, discover truths which, if they could now be told, would seem incompatible with many that appear most sure, but which, when they shall be discerned, and set in order, and grouped with those derived from the continued study of theology, will fill the intervals by which our beliefs now stand apart? For future knowledge will not be merely heaped-up on the surface of that we now possess; it will penetrate the mass and fill its gaps and interspaces, and make many things one which as yet seem multiple and alien. This has always been the course of knowledge—a growth not by accretion, but interstitial, compacting, unifying. And surely, as the growth of knowledge has harmonized many truths that seemed in discord, so will it attain to the clear evidences of the unity of theology and science.

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